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ABSTRACT

This paper describes paradigms for research into school learning conducted at the primary/secondary and tertiary levels. Paradigms discussed include the Process-Product paradigm, the Mediating Process paradigm, the Classroom Ecology paradigm, J. Carroll's Model of School Learning, B. Bloom's Mastery Learning model, and the multilevel causal modeling of the 1980s. At the tertiary level, status attainment models describe processes by which family status and parent education are converted into occupational status through educational attainment. An emergent trend has been witnessed in integrating assessment and instruction for quality classroom processes and learning outcomes. This trend involves changing views of educational indicators and school improvement, development of a humanistic and constructivist curriculum theory and practice, and a shift toward meaningful and authentic measurement. In order that the quality of learning in higher education can be better monitored, educators are urged to pay particular attention to the interrelationships between assessment and instruction. Specifically, students should be engaged in deep processing of learning tasks, teachers should deploy formative assessment for charting learning progress, and staff development programs should emphasize pedagogical and assessment expertise grounded in a sound theory of curriculum and guided by a viable multilevel conceptual model of learning. (Contains 39 references.) (JDD)

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Assessing Quality of Learning in Higher Education: Methods, Models and Perspectives

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Paper presented at the Sixth International Conference on Assessing Quality in Higher Education, July 19-21, 1994, Hong Kong, organized by Indiana University - Purdue University Indianapolis and the H+E Associates.

Assessing Quality in Higher Education - Problems and Issues

A system of higher education most often aim at high standard and exceptional quality which may be evaluated in terms of the ability levels of the entering students, the qualification and research output of the staff, and employability and subsequent achievement of the graduates. Status attainment models have been deployed for this type of evaluation (see Fagerlind, 1985 for examples). Compared with education at the elementary levels, higher education is a lot more expensive. Therefore, efficient deployment of human, material and time resources are needed in order to meet manpower needs and render community services (see Sizer, 1992 for a discussion of accountability and autonomy in higher education). Unfortunately, this model of higher education and the quality of its output are increasingly being challenged, for example, as the Hong Kong tertiary education system increases its intake from 5 to 18 percent of the age group (see Adelman, 1992 for a discussion of diversity and quality assurance in higher education). This challenge is brought about as the tertiary teaching staff while recruited because of their academic prowess and research competence may not be conversant with the principles of effective teaching and learning for the heterogeneous group of students. There is a danger that deep learning gradually gives way to shallow learning. Consequently, there is a need for staff development programs to enhance the pedagogical expertise of the tertiary teaching staff. In order to improve instructional effectiveness, formative and summative evaluation of the quality of the learning processes and products with reference to a model of learning is required (see Banta, 1992, for a review of formative and summative assessment of student achievement in general education and major fields at the higher education level). Alternative assessments of the quality of learning (e.g. portfolios, computer simulations of real-world problems, hands-on science problems) firmly rooted in a humanistic constructivist theory of knowing are also needed (see Harnisch and Mabry, 1993 for a discussion).

With these thoughts in mind, this paper seeks to describe some emerging paradigms for research into school learning conducted at the primary and secondary levels in the past three

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decades. It is hoped that these conceptual learning models found useful at the elementary levels, together with the status attainment models at the tertiary levels, can be of use to inform how quality learning at the tertiary levels may be understood and evaluation undertaken. After contrasting two conceptions of a school which have bearings upon the relationships between educational indicators and school improvement, and asserting the need for a humanistic and constructivist philosophy in curriculum theory and practice, as well as commenting on meaningful measurement as an emergent trend, this paper concludes that in order for quality learning in higher education be secured, there is a need for deep cognitive processing in our students, along with the promotion of formative assessments by the teachers.

Paradigms for Research into School Learning

Conceptualizations of school learning need very clear concepts of what teaching is and how it occurs. The former is a philosophical question underpinning the processes it involves. Hirst's (1975) analyses showed that the intention of all teaching activities is that of bringing about learning. The aim of learning is to achieve some end state. Specific teaching activities must clearly express what is to be learned and take place at a level where the student can take on what is intended to be learned. Successful teaching would seem to be simply teaching which does in fact bring about the desired learning. However, criteria of good teaching are nevertheless difficult to discern.

Doyle (1977) explicated three paradigms for research into teaching. The Process-Product paradigm relates teacher variables directly to effectiveness indicators such as student learning outcomes. It contains few explicit explanatory principles to guide the selection of variables or the interpretation of results. The Mediating Process paradigm focuses directly on the implicit human mental processes that mediate instructional stimuli and learning outcomes. Teacher behaviours and instructional materials influence learning outcomes only to the extent that they activate information-processing responses which determine what a student learns. The Classroom Ecology paradigm focuses on mutual relations amongst environmental demands and human responses in natural classroom settings. One main contrast between the latter two paradigms on task performance is that Mediating Process research focuses on variations in abilities to process subject matter as a source of differences in student learning outcomes, whereas the Classroom Ecology approach calls attention to the appropriate skills necessary to undertake classroom tasks.

A paradigm, according to Khun (1970), is an implicit framework that defines legitimate problems, methods and solutions for a research community during a certain period of time. During the past three decades, educational research was conducted under

the guidance of the above-mentioned three paradigms, proceeding from the Process-Product paradigm toward the Mediating Process and Classroom Ecology paradigms, as the problem sets and the methods used for tackling them changed. Carroll's tradition of time and school learning was particularly influential and hence deserves careful scrutiny (see Carroll, 1989 for a review). Carroll's thesis is that time is important in school learning since the teacher's work consists of the management of students' attention over time and over a curriculum. Carroll's (1963) leading paper, A Model of School Learning, represents an attempt to give a unified perspective on the types of basic variables and their inter-relationships that are proposed as affecting a student's degree of achievement. This is formally expressed as a function of the ratio of the time actively engaged in learning (expressed in terms of aptitude, perseverance, and opportunity to learn) to the time that the student would need in view of his or her aptitude, ability to understand instruction, and the quality of instruction offered.

Bloom's (1974) mastery learning model was an adaptation of Carroll's model exchanging variations in student learning for variations in time needed for students to learn. Bloom (1976) later presented a new formulation of mastery learning principles, of which student-entry cognitive and affective characteristics, and quality of instruction (i.e. cues, reinforcement, feedback, correctives) facilitate active participation (i.e. time-on-task), in order to account for the learning outcomes, including improved learning rates. The concept of student's time-on-task was further elaborated by Rosenshine and Berliner (1978) into Academic Learning Time, which refers to the time during which the student is actively engaged in learning tasks that are somewhat challenging and on which a high success rate can be attained. Thus, it is not solely the amount of the time devoted to a learning task that counts but also the way in which the time is utilized. One principle of effective pedagogy recognized by the educators is that teachers should direct and sustain the attention of their students. They must select and assign appropriate tasks, engage their students in the process of achieving the assigned tasks, and keep the students on-task (Anderson, 1984).

Carroll's tradition prevailed into the 1970s, taking a structural approach in the form of causal models of school learning toward the end of that decade. The empirical meta-analyses made in the early 1980s summarized the research findings and helped clarify and understand the meanings and inter-relationships of the constituent constructs in the earlier conceptual models of school learning (e.g. Fraser, Walberg, Welch and Hattie, 1987). Moving toward the end of the 1980s, advances in cognitive science research and the adoption of a socio-psychological approach to the study of learning environments have made the learning models more comprehensive than before - they are not only macroscopic in perspective but also microscopic and task-specific centring on the cognitive and affective processes

of the learners (see Figure 1 and 2 for a multilevel conceptual model of school learning; see also Cheung, 1993a, pp.248-252 for an analysis of this model's salient characteristics). Development of multilevel causal modelling as a statistical tool for analyzing process-product influence networks within, between, and across the different levels of the data hierarchy is also actively underway in the past decade (e.g. Cheung, Keeves, Sellin and Tsoi, 1990). Fine-grained qualitative analyses of learning tasks and the teaching and learning processes are also abundant in the literature (see Walberg, 1990 for an evaluation of this knowledge base; see also Cheung and Taylor, 1991; Cheung, 1994a for design principles of learning tasks).

<<Insert Figures 1 and 2 about here>>

At the tertiary level, status attainment models may be used to describe the processes by which family status and parent education are converted into occupational status through educational attainment, which is viewed as a mediator between social background and occupational attainment (e.g. see Blau and Duncan, 1967 for an early attempt from the life course perspective to examine status attainment; see Fagerlind, 1985 for a review). Later, there was a tendency for the status attainment models to include more background and process variables, such as cognitive ability and quality of schooling, as well as to introduce interactive effects of background and process variables over and above their combined additive effects. This type of research typically establishes the significance of formal education mediating between family background and occupational status attainment, although there is a tendency for educational effects to decline in importance over time. Consequently, in an egalitarian society, quality learning processes and outcomes in higher education are instrumental for attaining high status for the graduates, explaining the quest for assessing the quality of learning in higher education during the past decades.

Integrating Assessment and Instruction - An Emergent Trend

The past decade witnessed an emergent trend of integrating assessment and instruction for quality classroom processes and learning outcomes. There have been changing views regarding the kind and role of educational indicators for the purposes of school improvement and an acknowledgement of a humanistic and constructivist view of curriculum theory and practice. Congruent with these schooling and curriculum perspectives, which emphasize the significance of the interflow of meanings and the effects of learning contexts for personal development and school improvement, emerged the recent trend of meaningful and authentic measurement of learning processes and products. These trends are further elaborated below.

A. Changing Views of Educational Indicators and School Improvement

Byrk and Hermanson (1993) contrasted two conceptions of a school which have implications for the design of educational indicators for the purposes of school improvement. The first conception of a school is that it is viewed as a formal, bureaucratic organization whose constituents are characterized in terms of their defined roles, functions and structures, with limited personal discretion and an unambiguous accountability system. This rational-bureaucratic perspective results in educational indicators being designed mainly to tap critical resources, processes and outcomes so that the school operations can be parsimoniously represented as a production function (for examples in different higher education systems, see Cave and Hanney, 1992). The administrative staff is then able to exercise rational judgements on ways of school improvement and system restructuring.

The second conception of a school is that it is viewed as a social system where personal interactions are primary and that system reform often requires changing the values and tacit understandings that ground these interactions. This personal-communitarian perspective results in indicators being comprehended as information flows, communication channels, and feedback loops of personal meanings and intentionality. Prudent use of indicators require that such information be selected and recontextualized from a conceptual model of the operative educational system (preferably having a multilevel formulation within a cultural context) to particular cases or situations in order to understand adequately its salience for systems improvement. Hence, the multilevel conceptual model shown in Figure 1 and 2 should as far as practicable be analyzed and interpreted with this perspective in mind.

B. Humanistic and Constructivist Curriculum Theory and Practice

Humanistic education seeks to increase students' self-direction and curiosity and help them take responsibility for determining what they need and want to learn (Gage and Berliner, 1992). Moreover, learning how to feel is as important as learning how to think, and students' own evaluation is the only meaningful judgement of their work. From the constructivist perspective, learning is a process concerning the construction of meanings. Via social justification, the personal knowledge constructed is being negotiated to attain the status of publicly-mediated knowledge (for a discussion, see Cheung and Taylor, 1991). Since knowledge is created in response to the needs of the society, it is important that students can understand the changing needs of the communities where they live and how knowledge is progressively being developed in different cultural contexts. They should be encouraged to pose and solve personally-relevant problems, aware of the nature and meanings of the problems perplexing them, and investigate controversial issues of societal

concern. Their enquiries need to be based on multi-level and multi-angled perspectives and their choices and value orientations need to be personally carefully evaluated. Most important of all, students should be educated to deploy global resources and cultural heritage wisely (see Cheung, 1993c & 1994b for a discussion of sustainable living Earth and notions of sustainable development). Therefore, learning outcomes encompass not only facts and skills, but also feelings, values and meanings constructed as a result of organizing and making sense of their everyday and learning experiences.

C. Meaningful and Authentic Measurement as an Emergent Trend

During the 1990s, there has been a shift of norm-referenced formal assessment of individual students (e.g. the contrived standardized achievement tests) toward criterion-referenced authentic classroom assessment (e.g. portfolios of student work across time and task contexts within a classroom setting) and performance assessment (e.g. investigative and problem-solving tasks in real-world settings) (see Wiggins, 1992 for a discussion). Authentic classroom assessment and performance assessment acknowledge students' cultural and societal diversities by allowing alternative ways of solving problems and accomplishing tasks. These new modes of assessment, often with teachers and peers as participant observers and evaluators, focus on what students can do in a holistic manner or on whether they can meet the required standard, rather than on how well they can do relative to other students. Therefore, it has been suggested that scaffolding in the form of teacher instruction, peer interaction, and cooperative learning is a legitimate and expected part of the assessment process, highlighting the close interplay between assessment and instruction (Garcia and Pearson, 1994; see also Feuerstein, 1979 for his notion of dynamic assessment).

Discussion

In order that the quality of learning in higher education can be better monitored than hitherto, teaching staff of institutes of higher learning need to pay particular attention to the inter-relationships between assessment and instruction (see Glaser and Silver, 1994 for a review of some of these efforts). Specifically, students should be engaged in deep processing of the learning tasks presented to them (see Figure 2 for the various constructs and process variables involved). Furthermore, teachers should deploy formative assessment for charting learning progress and expressing students' shortcomings and potential. This proposal, which has implications on the aims and content of the staff development program for the development of pedagogical expertise, is elaborated further below.

A. Deep, Surface and Strategic Approaches to Learning

Entwistle (1994) noted that students entering higher education are commonly not well-prepared for the different types of learning and studying required of them. Rather than the teachers organizing the learning experiences for the students through careful presentation in packaged form and regular assignments, students of higher education have to increasingly assume greater responsibility in practising independent studying. Entwistle asserted that the three common approaches to learning (i.e. deep, surface, and strategic processing of the learning tasks) are each supported by a distinctive form of motivation (i.e. intrinsic motivation, instrumental motivation/fear of failure, and need for achievement for the three approaches to learning respectively). It has been noted that there is a tendency for students to adjust their approaches to learning in response to the different forms of assessment (e.g. surface processing for the short-answer and multiple-choice questions; deep processing for the open-ended essay questions, problem-solving and project work) and what they want to gain from the course (i.e. in accordance with their academic, vocational, personal, and social orientations of study).

Deep processing of course content was shown by some research to be more successful than surface processing (e.g. Heggarty-Hazel and Prosser, 1991). Furthermore, it has been observed that when under pressures of tests and examinations, the deep-processing learners may revert to surface processing in order to alleviate the problem of cognitive overload. Consequently, learning styles (e.g. holist versus serialist in accordance with the two very contrasting ways of perceptual processing and meaning construction) affect immensely the quality of learning processes and outcomes (Pask, 1976). As an example, students learn not only faster but also more fully when their learning styles match with the requirements and features of the learning materials. Since cognitive processing takes time and students' ideas do not emerge in continuous form but tend to burst in discrete form with gaps in between, wait time before and during a student's response to questions is also an important quality factor because this is when meanings are constructed and negotiated (Tobin, 1984).

B. Formative and Summative Assessment by Teachers

Formative assessment by the teachers is central to good teaching and learning (Black, 1993). This is because the formative assessment information can be immediately used by both the students and teachers to modify their work in order to make it more effective (see the feedback loops in Figure 1 and 2). Some form of differentiated teaching may be required in order to cater for the heterogeneity in the learning needs of the students. Summative assessment, however, is continued to be essential for the certification and accountability functions.

Formative assessment, when integrated with the instructional processes guided by a sound conceptual model of learning and rooted in a humanistic/constructivist curriculum perspective, promotes effective learning. The scope of classroom assessment may be further broadened so that assessment is no longer limited to the examination of decontextualized isolated facts or skills using timed paper and pencil tests. Instead, there can be more frequent use of observations of student work in progress, performance assessments of authentic learning tasks presented in various contexts, and systematic recording against criteria which are results of negotiations between teachers and students. Consequently, criterion-referenced assessment feedback, characteristic of formative assessment and central to the personal-communitarian conception of a school, help better monitor student progress and express potentials and shortcomings than that of the high-stakes summative assessment commonly associated with schools taking the rational-bureaucratic perspective.

With reference to a model of progression and development for drawing inferences and recommending paths of learning within a clearly specified domain of study, the construct validity of the formative assessment feedback is increased when inferences and actions can be shown to improve the quality of learning and satisfy the needs of the students (see Cheung and Taylor, 1991 for a viable model of human progression and development). Furthermore, self-assessment by students and peer appraisal amongst students, with a distinctive advantage of holding the students responsible for their own learning progress and determining success criteria and mastery standards, may be included as viable formative assessment tools as well (see Falchikov and Boud, 1989 for a review).

In sum, this paper argues for the need for the students in higher education to take a deep approach to learning and for the teachers to deploy formative assessment of the learning processes and products. It highlights the importance of communication channels and feedback for institutional improvement. Staff professional development programs should not only emphasize academic prowess and research competence but also pedagogical and assessment expertise which should be grounded in a sound theory of curriculum and guided by a viable multilevel conceptual model of learning.

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Figure 1

Conceptual Model of School Learning - Institutional Level
(from Cheung, 1992; first appeared in Cheung, 1989, p.62)

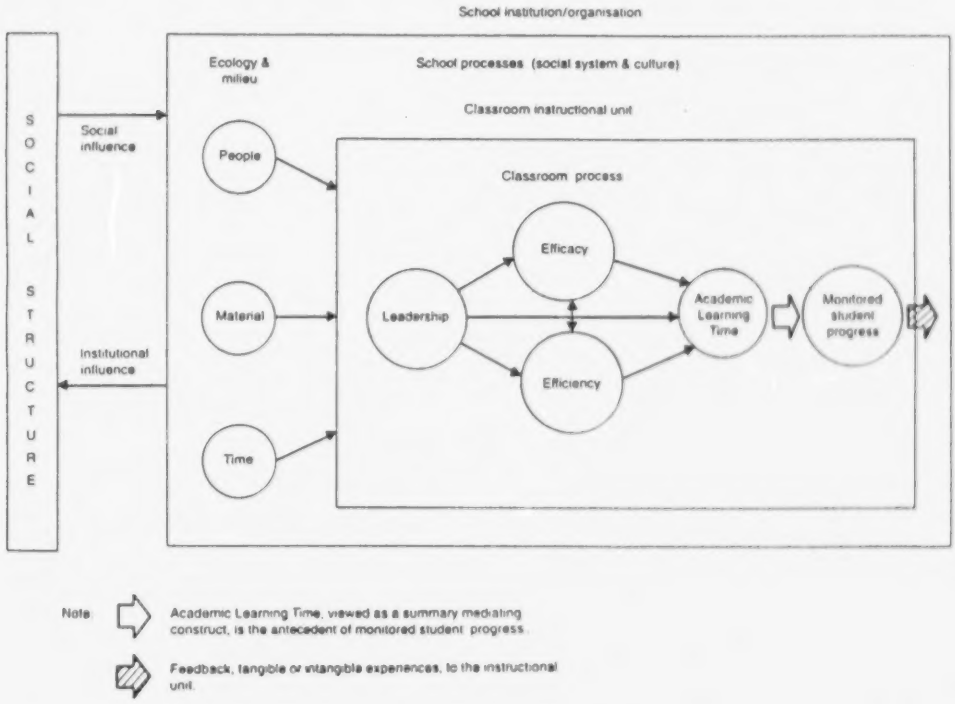
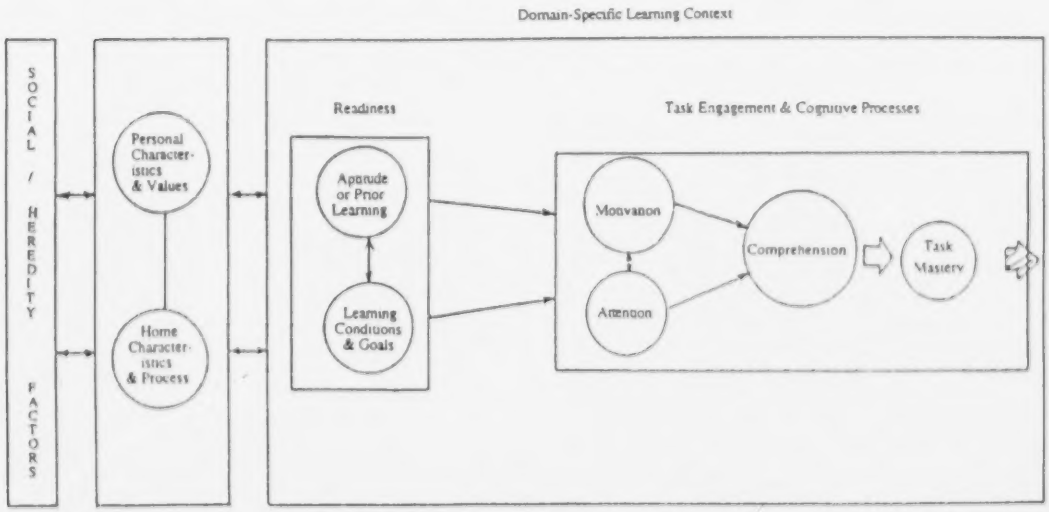


Figure 2
Conceptual Model of School Learning - Learner Level
(from Cheung, 1993b; first appeared in Cheung, 1989, p.72)


Domain-Specific Learning Context
SOCIAL / HEREDITY FACTORS
Personal Characteristics & Values
Home Characteristics & Process
Readiness
Aptitude or Prior Learning
Learning Conditions & Goals
Task Engagement & Cognitive Processes
Motivation
Attention
Comprehension
Task Mastery
Note:
Comprehension, a summary mediating construct for task perception, cognitive and memory process, is the antecendent of task mastery.
Feedback, tangible or intangible experience, to the learning tasks and cognitive processing system.

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